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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte HISASHI OHTANI and TORU MITSUKI

Appeal 2009-0328
Application 09/379,702
Technology Center 2800

Oral Hearing Held: January 14, 2009

Before KENNETH W. HAIRSTON, MAHSHID D. SAADAT, and KARL D. EASTHOM, Administrative Patent Judges

ON BEHALF OF THE APPELLANTS:

HUSSEIN AKHAVANNIK, ESQUIRE
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The above-entitled matter came on for hearing on Tuesday, December 9, 2008, commencing at 9:55 a.m., at The U.S. Patent and Trademark Office, 600 Dulany Street, Alexandria, Virginia, before Lorie B. Allen.

JUDGE HAIRSTON: Do you have a business card with you?

MR. AKHAVANNIK: No, I don't.

JUDGE HAIRSTON: Okay. Do you mind spelling your name for the record?

MR. AKHAVANNIK: Absolutely. It's Hussein, H-u-s-s-e-i-n; and my last name is, A-k-h-a-v-a-n-n-i-k.

JUDGE HAIRSTON: Thank you.

MR. AKHAVANNIK: You're welcome.

Good morning, Your Honors. My name is Hussein Akhavannik and I represent the appellant, Semiconductor Energy Laboratories.

The appellant has appealed the rejection of claims 45 through 64 over one of the appellant's own patents, Yamazaki, in view of Matsumoto.

Of these claims, claims 45 to 49 are independent. Each shares similar features.

In particular, the independent claims each recite that a semiconductor device includes a gate insulating film, including a first and second insulating film.

The first insulating film has a side aligned with a side of a crystalline semiconductor island and a second film extends beyond the first insulating film; and the reason I bring up those features is, the rest of the argument is directed towards that.

Therefore, all the independent claims require a gate insulating film having two insulating films with different horizontal dimensions. An example of such insulating film is shown in the application in figure 1-E wherein the first insulating film corresponds to reference number 104 and has at least one side aligned with the semi-conductor island 107. The second

insulating film, 109, is then put over the first insulating film and the semiconductor island. Neither Yamazaki, Matsumoto nor any proper combination of these references describe or suggest this feature.

As the Examiner's Answer acknowledges, Yamazaki only discusses one semi-insulating layer which is referred to by designation, designator three; if you look at figure 5-C, for example.

Therefore, the Examiner relies on Matsumoto for a second semiconductor and insulating layer.

If you look at figure one in Matsumoto, it discusses a matrix region which is towards the right-hand side of the page which has two separate insulating layers referred to by designation IDs 14 and 19, above a semi-conductor thin film eleven.

Column three of Matsumoto discloses that both of these insulating layers have the same horizontal dimensions which extends across the entirety of the substrate referred to by reference ID one.

JUDGE HAIRSTON: The insulator 14. It goes beyond the electrode 26. But what in your claim precludes that from happening? Both the insulator 19 and the insulator 14 extend the whole length of the thin film.

MR. AKHAVANNIK: That's correct.

JUDGE HAIRSTON: Both of them have sides that are aligned with a side of a crystalline island. They just so happen to go beyond the island. The lower insulator 14 has sides aligned with the island but it also has sides that go beyond the island.

Your claim doesn't preclude the lower layer from having sides that align with the island and also having sides that go beyond the island.

MR. AKHAVANNIK: So, just to make sure I understand your question correctly, you're saying that a discrete portion of one of the layers 14 and 19 could refer to a side of that insulating --

JUDGE HAIRSTON: I see the insulator being broken up by the electrode 26, the electrode going to the source and drain, 11-B. That island has a discrete section of insulating material under the gate, under the gate electrode. Fourteen is the discrete section of insulator under the gate electrode and it's aligned with a side of the crystalline semiconductor island; right?

MR. AKHAVANNIK: My understanding of this figure is that you view it in three dimensions and that the insulating layers are continuous.

JUDGE HAIRSTON: Right. Yes. That's what happens here in Matsumoto. Yes.

MR. AKHAVANNIK: So, there's not one side of insulating layers 14 and 19 that is aligned given the cross sectional view shown in figure one.

JUDGE HAIRSTON: Mm-hum.

MR. AKHAVANNIK: It may be that there are different parts, for example the electrodes, that are placed in different portions of the semiconductor device but those insulating layers are continuously formed along the semi-conductor, substrate one.

JUDGE HAIRSTON: Okay. You're saying we only see part of the picture here. Okay. I understand.

JUDGE SAADAT: Are you talking about the direction perpendicular to the paper?

MR. AKHAVANNIK: Yes; that's correct.

JUDGE SAADAT: But in this, the cross-section that's shown on the cover of the reference -- the two insulating layers that are under the gate do both, go to the edge of the -- or at least align with the sides of the island where the two electrodes contact source and drain and also they go beyond; and the claim doesn't preclude that one should not go beyond.

MR. AKHAVANNIK: I believe that when you look at the claims in view of the specification, the side is disclosed. For example, in figure 1-E, when it says "a side," that means it's aligned with the semiconductor island. The semiconductor island and the insulating layer 104 are etched together to have the island shape, if you will.

So, given that the insulating layers 14 and 19 of Matsumoto extend along the entirety of the substrate, I don't believe that it's reasonable to say that they have a side that is aligned with one of the semiconductor islands or for example the gate electrode 20.

JUDGE EASTHOM: Can we compare figure 2-C and figure 2-D? Look at the electrodes, 11a and 11b; and then 14 is right over those. So, right where 14 in figure 2-D, 14 as an interior side that abuts up against the electrode 11b. So, that side on the inside of the layer is aligned with it.

MR. AKHAVANNIK: To make sure I'm understanding your question correctly, along the right side, starting from the right to the left of the figure in Matsumoto, the insulating layer 14 goes across, abuts 11b, that portion of the semiconductor thin film, and then extends beyond, above.

JUDGE EASTHOM: Right. Right where that abuts is where the side aligns, that inside of the wall aligns.

MR. AKHAVANNIK: And then the insulating layer 19 basically runs parallel to that, above it.

JUDGE EASTHOM: Right.

MR. AKHAVANNIK: Again, given that exact description, in such scenario, both 14 and 19 have the same dimension.

JUDGE EASTHOM: But your claim doesn't preclude that.

MR. AKHAVANNIK: Doesn't preclude them from having the same dimension?

JUDGE EASTHOM: Does it? Maybe I missed it.

MR. AKHAVANNIK: You can look at, for example, claim 45. It discusses the structure of the semiconductor device --

JUDGE EASTHOM: I'm looking for the word "dimension," "different dimension."

MR. AKHAVANNIK: Well, the final element says that the second insulating layer extends beyond an edge of the first insulating layer.

JUDGE EASTHOM: It does; but it doesn't say the first one doesn't. The first one, as both the Judges have said, can also extend beyond.

JUDGE SAADAT: What it means is the layer is just broken up, for example, by the contact so it creates a portion in the middle that is aligned with the edge of the island and also beyond the contact. It includes portions that go beyond the edge of the island. That's the interpretation we get from it.

MR. AKHAVANNIK: But on such an interpretation, if I'm understanding correctly, the insulating layer 14 is what you're referring to being both the first and the second insulating film.

JUDGE EASTHOM: No.

JUDGE SAADAT: No. No, no.

JUDGE HAIRSTON: Fourteen is the first insulating film in Matsumoto and 19 would be the second insulating film.

MR. AKHAVANNIK: But because 14 is continuous beyond --

JUDGE HAIRSTON: What we're saying is, your claim doesn't preclude it from continuing on.

MR. AKHAVANNIK: I would say that when you have an edge of something --

JUDGE HAIRSTON: But we found an edge. All claim 45 says is to find that side aligned with a side of the crystalline semiconductor island. Fourteen has that. It goes on and continues on beyond the island; but the claim doesn't preclude the insulator 14 from going beyond the island.

Also, I see your name is not on the brief and reply brief.

MR. AKHAVANNIK: I have associate power of attorney. It was filed yesterday.

JUDGE HAIRSTON: But where is this argued in the brief? The brief is very brief and the reply brief is very brief. Where are the arguments made concerning the two insulator layers? I don't see those arguments.

MR. AKHAVANNIK: For example, I know that in particular the reply brief, on the second page -- well, starting on the first page, the final paragraph, talks about -- I apologize. Let's see here.

(Pause.)

MR. AKHAVANNIK: You want to see where the reply brief or the --

JUDGE HAIRSTON: You're making a very specific argument now concerning claim 45. Where is that argument in the brief and reply brief.

MR. AKHAVANNIK: The argument that the two insulating layers have different horizontal dimensions?

JUDGE HAIRSTON: Right.

MR. AKHAVANNIK: Starting on page four of the appeal brief, it talks about the processes that will be required to create different insulating films having different dimensions and why of those methods only one of them would have resulted in the two different dimensions and why it would not have been obvious to one of ordinary skill to use that fourth method.

JUDGE HAIRSTON: These are just hypotheticals.

MR. AKHAVANNIK: No. The processing used to create the semiconductor device in our application is laid out so that the first insulating layer has different dimensions, the second insulating layer.

These hypotheticals are used to discuss -- because of the lack of concrete analysis given by the Examiner on why the combination of Matsumoto into Yamazaki would not have been obvious.

What the Examiner does is discusses why an increased thickness of the insulating layer would provide some of the benefits of the matrix region in Matsumoto.

JUDGE HAIRSTON: Right.

MR. AKHAVANNIK: He doesn't discuss why one would have been motivated to have two different dimensions of an insulating layer and take only one of the insulating layers in Matsumoto and place it over top of the insulating layer three of the Yamazaki; and to do so, one of these four implementations would have had to have been used, and that's what we addressed in the appeal brief.

JUDGE HAIRSTON: Okay.

JUDGE EASTHOM: Just quickly. The first layer, insulating area in Yamazaki, you're saying that doesn't have sides aligned or it does?

MR. AKHAVANNIK: No, I'm not saying that.

JUDGE EASTHOM: Layer seven?

MR. AKHAVANNIK: It does have sides aligned with the semiconductor island; but again, Yamazaki only discusses one insulating layer and Matsumoto discusses two semiconductor layers having the same dimensions, horizontal dimensions. There is nothing in the art that would suggest to one of ordinary skill why you would only want to take one of those insulating layers.

JUDGE EASTHOM: Well, you're just trying to lay another layer over the top for more insulation. What's surprising about that?

MR. AKHAVANNIK: As discussed by the four methods, to do so and have the same structure recited in the claim, you would have to use only one of the two insulating layers provided by Matsumoto.

JUDGE EASTHOM: Right. The top one, for example.

MR. AKHAVANNIK: That's correct.

In our application, we describe that our insulating layer three has a thickest that's determined to be optimal, to minimize reflectivity of laser light.

JUDGE EASTHOM: Yours is?

MR. AKHAVANNIK: That's correct.

And so, to have a thin insulating layer and then have a thicker insulating layer Matsumoto put on top of it -- I don't see how that would have been predictable by someone reviewing these references.

JUDGE SAADAT: Well, multiple gate insulator or insulating layers is not uncommon, I mean for a variety of reasons, like maybe adhesion to the layer underneath, maybe for, as you said, reflective, maybe for --

JUDGE EASTHOM: Pin-hole covers.

JUDGE SAADAT: Yes. Pin-hole covers. Ease of processing. There are plenty of reasons that one would want to look at other options.

So, our concern is basically what exactly the claim requires with respect to dimension of these two layers.

MR. AKHAVANNIK: I agree with what you're saying. As shown in Matsumoto, multiple insulating layers have been used prior to our application date. However, having the two insulating layers, having the different dimensions is some- thing that we have done and I haven't seen in any of the art.

Now, going back to your point about the requirement in the claim for that to be so, having the final element in claim 45, for example, saying that, having one insulating film extends beyond another, I believe requires that you have two of at least different dimensions.

Matsumoto as described by the Examiner may suggest that you may want to have an additional thickness in a vertical dimension from the substrate but it doesn't have any discussion about horizontal dimension of the insulating layer which is what claim 45 has relative differences between.

JUDGE HAIRSTON: Okay. Is that it?

MR. AKHAVANNIK: Do you have any other questions for me?

JUDGE HAIRSTON: Any other questions?

JUDGE SAADAT: No.

JUDGE HAIRSTON: Okay.

JUDGE EASTHOM: I have none. Thank you.

JUDGE HAIRSTON: Thank you, counsel.

MR. AKHAVANNIK: Thank you.

(Whereupon, at approximately 10:10 a.m., the proceedings were concluded.)